

What is claimed is:

1. A dynamo-electric machine comprising:  
a commutator secured around a rotatable shaft; and  
a plurality of carbon brushes placed in sliding contact with said commutator, wherein said commutator has a sliding contact surface placed in sliding contact with said plurality of carbon brushes, said sliding contact surface of said commutator having a plurality of peaks and valleys that are substantially regularly and alternately arranged in both axial and circumferential directions of said commutator.
2. A dynamo-electric machine according to claim 1, wherein a circumferential pitch of said valleys measured in said circumferential direction of said commutator is in a range of about 10 to 400  $\mu\text{m}$ .
3. A dynamo-electric machine according to claim 1, wherein a ten-point average roughness ( $R_z$ ) of said sliding contact surface of said commutator is in a range of about 0.5-10.0  $\mu\text{m}$ .
4. A dynamo-electric machine according to claim 1, wherein said plurality of peaks and valleys of said sliding contact surface of said commutator are constructed in such a manner that said peaks of said sliding contact surface of said commutator scrape a sliding contact surface of each said carbon brush placed in sliding contact with said sliding contact surface of said

commutator, and carbon brush powder scraped from said sliding contact surface of said each carbon brush is accumulated in said valleys of said sliding contact surface of said commutator and acts as lubricant powder that reduces friction between said sliding contact surface of said commutator and said sliding contact surface of said each carbon brush.

5. A dynamo-electric machine according to claim 1, wherein said plurality of peaks and valleys of said sliding contact surface of said commutator are arranged along a helical path on said sliding contact surface of said commutator.

6. A dynamo-electric machine according to claim 1, wherein said plurality of peaks and valleys of said sliding contact surface of said commutator are arranged to form a mesh-like structure, said peaks constituting nodes of said mesh-like structure, each adjacent two peaks being interconnected by an inwardly curved ridge.

7. A dynamo-electric machine comprising:

a commutator secured around a rotatable shaft; and

a plurality of carbon brushes placed in sliding contact with said commutator, wherein said commutator has a sliding contact surface placed in sliding contact with said plurality of carbon brushes, said sliding contact surface of said commutator having a plurality of peaks and valleys that are substantially regularly and alternately arranged in a

circumferential direction of said commutator.

8. A dynamo-electric machine according to claim 7, wherein a circumferential pitch of said valleys measured in said circumferential direction of said commutator is in a range of about 10 to 400  $\mu\text{m}$ .

9. A dynamo-electric machine according to claim 7, wherein said plurality of peaks and valleys of said sliding contact surface of said commutator are arranged along at least one circumferential path that extends in said circumferential direction of said commutator.

10. A method for manufacturing a dynamo-electric machine including a commutator secured around a rotatable shaft and a plurality of carbon brushes placed in sliding contact with said commutator, said method comprising a step of:

processing a sliding contact surface of said commutator, which is placed in sliding contact with said plurality of carbon brushes upon assembly of said dynamo-electric machine, to form a plurality of peaks and valleys in said sliding contact surface of said commutator with use of a cutting apparatus and a vibration generating apparatus, said plurality of peaks and valleys being substantially regularly and alternately arranged in both axial and circumferential directions of said commutator.

11. A method according to claim 10, wherein said plurality of

peaks and valleys of said sliding contact surface of said commutator are formed during surface finishing of said sliding contact surface of said commutator.

12. A method according to claim 10, wherein said vibration generating apparatus is an ultrasonic vibration generating apparatus.

13. A method according to claim 10, wherein a circumferential pitch of said valleys measured in said circumferential direction of said commutator is in a range of about 10 to 400  $\mu\text{m}$ .

14. A method according to claim 10, wherein a ten-point average roughness ( $R_z$ ) of said sliding contact surface of said commutator is in a range of about 0.5-10.0  $\mu\text{m}$ .

15. A method according to claim 10, wherein:

said cutting apparatus includes a single point tool having a cutting edge;

said plurality of peaks and valleys of said sliding contact surface of said commutator are formed by cutting said sliding contact surface of said commutator with said cutting edge of said single point tool; and

vibrations generated from said vibration generating apparatus are applied to one of said sliding contact surface of said commutator and said single point tool.

16. A method according to claim 15, wherein said vibrations generated from said vibration generating apparatus are applied to said single point tool.

17. A method according to claim 15, wherein:

said cutting apparatus is a lathe;

said commutator is held by said lathe and is rotated by said lathe at a predetermined rotational speed;

said vibration generating apparatus is connected to said single point tool to vibrate said single point tool at a predetermined frequency and a predetermined amplitude in a generally radial direction of said commutator; and

said single point tool is moved at a predetermined speed along said sliding contact surface of said commutator in said axial direction of said commutator while said single point tool is vibrated by said vibration generating apparatus, and said commutator is rotated by said lathe.